

## Kaibab Deer Population Problem

Before 1905, the deer on the Kaibab Plateau on the north rim of the Grand Canyon in northern Arizona were estimated to number about 4,000 on almost 300,000 hectares of range. The average carrying capacity of the range was estimated to be about 30,000 deer. On November 28, 1906, President Theodore Roosevelt created the Grand Canyon National Game Preserve to protect "the finest deer herd in America."

Unfortunately, by this time the Kaibab forest area had already been overgrazed by sheep, cattle, and horses. Most of the tall perennial grasses had been eliminated. The first step to protect the deer was to ban all hunting. In addition, in 1907, the National Forest Service tried to exterminate the predators of the deer. Between 1907 and 1939, 816 mountain lions, 20 wolves, 7388 coyotes, and more than 500 bobcats, all predators of the deer, were killed.

Using the data in the chart, graph the size of the deer population vs time on a piece of graph paper.

Deer Population on the Kaibab Plateau	
Year	Deer Population
1905	4,000
1910	9,000
1915	25,000
1920	65,000
1924	100,000
1925	60,000
1926	40,000
1927	37,000
1928	35,000
1929	30,000
1930	25,000
1931	20,000
1935	18,000
1939	10,000

Using a colored pencil, draw and label a straight line across the graph showing the carrying capacity.

Questions:

1. During what time span did the deer population seem to show exponential growth? What characteristics of the growth rate seem to indicate that the growth is exponential?
2. At what time in this exponential growth curve did the population come closest to, but not exceed the carrying capacity?
3. Given the knowledge of the practices of ranchers in the area, do you think the carrying capacity for deer is actually 30,000? Why or why not?
4. If the Forest Service's goal in exterminating predators was to increase the size of the deer herd, did the campaign to exterminate all predators of deer produce the desired effect?
5. What did the range managers not understand about predators when they came up with this plan?
6. What management strategies might you have used to increase the number of deer before the extermination of the predators began? Why do you think this would have worked?

Signs that the deer population was out of control began to appear as early as 1920.

7. What are some of the signs that game managers might look for to make this determination?

One of the things that the Forest Service did was to reduce the number of livestock grazing permits. A visit to the area in 1923 showed that the deer were on the verge of starvation, and the range conditions were described as deplorable.

8. How many deer were there in the area in 1923? How does this compare to the carrying capacity? What are two things that you could have done in 1923 to get things back under control?

9. Would you have considered reintroducing predators at some earlier point? Why or why not? If so, during what year would you have done that?
10. Does this population ever show a logistic growth pattern? Why or why not?
11. During what time period was the the greatest loss of deer? Give your best explanation of what you think was happening in the deer herd at that time?
12. At what point during its decline, did the deer herd actually reach the carrying capacity?
13. Why did the population not stay at that level?
14. A committee investigating the problem advised that all livestock not owned by local residents be removed immediately from the range and that the number of the deer be cut in half as soon as possible. Hunting was reopened in the fall of 1924, and only 675 deer were killed by hunters. This represents only 1/10 th of the number that had been born that spring. Why do you think that opening hunting had so little an effect on the population size?
15. Why do you think that the livestock restrictions were not a total removal of all grazing animals?
16. Why were there only 10,000 deer living in the Kaibab Plateau in 1939, the predicted carrying capacity is 30,000.
17. What do you think the deer herd in the Kaibab Plateau was like 50 years after this series of events? Why?
18. Do you think that feeding the deer would have been a good idea? When would you have done this? Explain why you think your strategy would have worked?
19. What long range strategies would you recommend in order to maintain a healthy deer herd on the Kaibab plateau?

20. In looking at the adult deer (breeding population) it seemed that there more females than males after hunting was permitted. Is there a logical explanation for this? Will this significantly affect the number of fawns the following spring? Why or why not?